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(56) Documents Cited

GB 2253131 A GB 2124072 A EP 0215408 A2

EP 0115286 A1 WO 88/07337 A1

(58) Field of Search

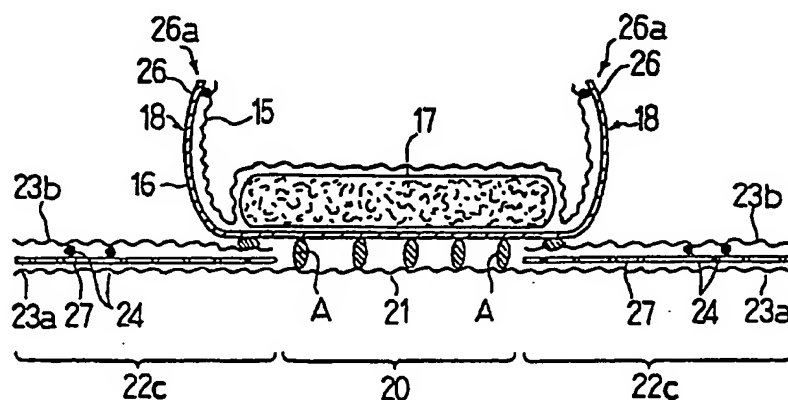
UK CL (Edition L) A3V

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(54) Shorts type diaper

(57) The diaper 1 comprises an absorbent body including a liquid permeable topsheet 15, a liquid impermeable and vapor permeable backsheet 16 and an absorbent core 17 interposed therebetween; and an outermost layer sheet to which the absorbent body is connected by adhesive A. Opposite side edge portions (22a and 22b, Fig. 2) of front and back portions of the outermost layer sheet are fixedly connected to each other respectively to form shorts having a waist opening portion (11, Fig. 1) and a pair of leg opening portions (7). The outermost sheet is formed, at a central portion 20 thereof in cross section, by a single layer fiber-like sheet 21, and opposite side edge portions 22c forming the leg opening portions (7) are formed by a plurality of fiber-like sheets 23a and 23b with expansible elastic members 24 therebetween. A liquid impermeable and moisture permeable film 27 is provided between sheets 23a and 23b. The absorbent body may be peeled from the outer layer when boiled and replaced. Further elastication 26 is provided in the absorbent body and at (12 and 14) in the outermost layer.

FIG. 3



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FIG. 1

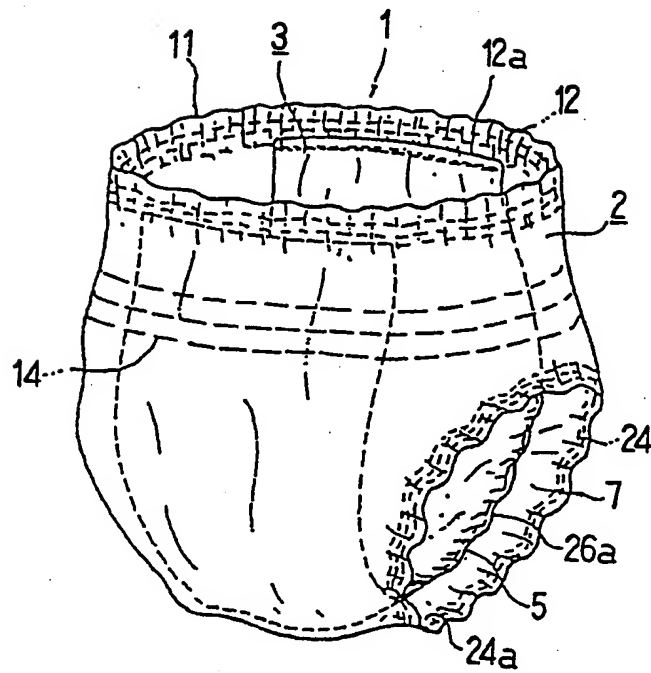


FIG. 3

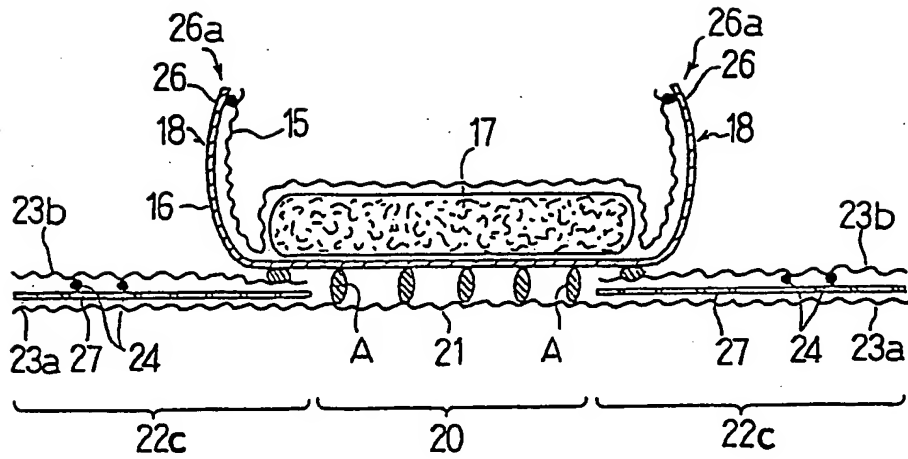
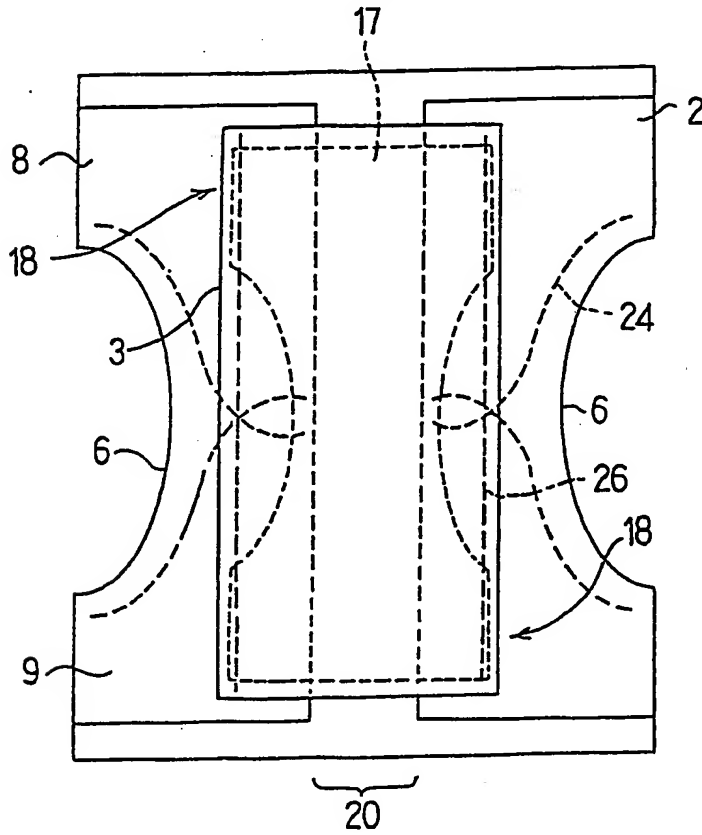


FIG. 4



DISPOSABLE DIAPER

BACKGROUND OF THE INVENTION

[Field of the Invention]

This invention relates to a disposable diaper and particularly to a disposable diaper for the use of infants, adult persons, or incontinent persons.

[Description of the Prior Art]

As disclosed in, for example, Japanese Patent Publication No. Sho 52-40267, a typical conventional flat type disposable diaper comprises a diaper body including a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent core interposed therebetween. Side flaps extending sidewardly of the diaper body are provided with expansible elastic members, respectively, so that gathers are formed by the expansible elastic members. Fasteners are provided to opposite side edges on the back side of the side flaps, respectively. This arrangement is intended for improving fitness and anti-leakage. There is also known a disposable diaper as disclosed in Japanese Laid-Open Patent Publication No. Sho 62-250201, in which a gather of each leg portion is formed in a three-dimensional structure and a flap portion around an absorbent body

is made of a water repellent material in order to enhance the effect of anti-leakage.

Recently, there was proposed a so-called shorts type disposable diaper as discussed in Japanese Laid-Open Patent Publication No. Sho 57-77304, in which a stomach side area and a back side area of a pair of side flaps are fixedly connected to form a pair of leg portions and a waist opening portion. In this shorts type disposable diaper, the leg opening portions and the waist opening portion are expansible so as to enhance fitness to the wearer's body. Usually, the shorts type disposable diaper is worn by its wearer in a standing state, and therefore it is not only useful as a training pants for encouraging an infant to be well without a diaper but also as a diaper for the use of an incontinent person or a person who has difficulty in walking.

However, since the above conventional shorts type disposable diaper is required to form an under-crotch portion narrow, the expansible elastic member cannot be arranged in such a manner as to be spaced away from the absorbent core. As a result, it is difficult for the diaper to exhibit its original expansible physical property because it is adversely affected by rigidity of the absorbent core. At the same time, connected

portions at opposite side edge portions of the diaper are readily susceptible to wrinkle and gap, thus creating a cause of leak of discharge material. For the leg gathers formed in a three-dimensional structure so as to be effective for anti-leak, this shorts type disposable diaper has such problems that the under-crotch portion is narrow and manufacturing is difficult.

The water repellent technique to be applied to the peripheral portion of the diaper is indeed effective to prevent leak of discharge material, particularly, urine. However, this technique, when applied to the shorts type disposable diaper, cannot exhibit its full effect because the under-crotch portion is narrow, and a hydrophilic portion and a water repellent portion are difficult to be made clearly distinctively.

Furthermore, since the conventional disposable diaper is designed such that the discharge material is absorbed and held by only an area around an urine discharge point, it is only this area which is soiled by the discharge material and the other part, for example, a side portion of the waist, is not substantially soiled. It is wasteful and uneconomical to dispose a whole diaper when the diaper is partly soiled.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a shorts type disposable diaper which is capable of effectively preventing leak of discharge material, which does not get stuffy, and which has an excellent compliance.

Another object of the present invention is to provide a shorts type disposable diaper, in which only the portion soiled by discharge material can be exchanged.

The present invention has achieved the above object by providing a shorts type disposable diaper comprising an absorbent body including a liquid permeable topsheet, a liquid impermeable and vapor permeable backsheet placed opposite to the topsheet, and an absorbent core interposed therebetween, and an outermost layer sheet to which the absorbent body is connected and opposite side edge portions of a stomach side portion and a back side portion of the outermost layer sheet being fixedly connected to each other respectively to form a waist opening portion and a pair of leg opening portions, wherein the outermost sheet is formed, at a central portion thereof in cross section, by a single layer fiber-like sheet, and opposite side edge portions forming the leg opening portions are

formed by a plurality of fiber-like sheets and expansible elastic members connectively held by and between the fiber-like sheets, first leg gathers being formed at the leg opening portions respectively by the expansible elastic members.

According to the disposable diaper of the present invention, when the absorbent body connected to the outermost layer sheet is applied to the under-crotch portion of the wearer as often experienced with an ordinary undergarment, the leg opening portions of the shorts type outermost layer sheet are fitted to the leg portions of the wearer when the diaper is in a wearing condition and therefore leak of the discharge material from these portions can be positively prevented.

Furthermore, since the central portion of the outermost layer sheet is formed of only a single layer fiber-like sheet, the central portion is excellent in moisture permeability and can be prevented from getting stuffy during the wearing condition of the diaper. Moreover, since the first leg gather portions are formed of a plurality of fiber-like sheets, leak of urine from the first leg gathers can be positively prevented.

Furthermore, since the central portion of the outermost layer sheet is formed in a single layer, this

portion is excellent in compliance to the under-crotch portion of the wearer.

In the disposable diaper of the present invention, if expansible elastic members are provided to opposite side edge portions of the absorbent body and second leg gathers are formed of the expansible elastic members, leak of discharge material can be more positively prevented by the second leg gathers.

Moreover, in the disposable diaper of the present invention, if the absorbent body is peelably connected to the outermost layer sheet, it is possible to reuse the outermost layer sheet by replacing the used absorbent body by a new absorbent body.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a disposable diaper according to one embodiment of the present invention;

Fig. 2 is a plan view, partly cutaway, of the disposable diaper of Fig. 1 which is in an expanded condition;

Fig. 3 is a sectional view of the disposable diaper of Fig. 2 taken on line III-III; and

Fig. 4 is a plan view of a disposable diaper according to another embodiment of the present inven-

tion.

DETAILED DESCRIPTION OF THE EMBODIMENT

One embodiment of the present invention will be described hereinafter with reference to the accompanying drawings.

A disposable diaper 1 according to one embodiment of the present invention is a so-called shorts type. As shown in Figs. 1 and 2, the shorts type disposable diaper 1 comprises an absorbent body 3 including a liquid permeable topsheet 15, a liquid impermeable and vapor permeable backsheet 16 placed opposite to the topsheet 15, and an absorbent core 17 interposed therebetween, and an outermost layer sheet 2 to which the absorbent body 3 is connected and, when the diaper is in a wearing condition, surrounding a wearer's waist to hold the absorbent body in an abutting condition relative to the wearer. Opposite side edge portions 22a and 22b of a stomach side portion and a back side portion of the outermost layer sheet 2 are fixedly connected to each other respectively to form a waist opening portion 11 and a pair of leg opening portions 7 and 7. The outermost sheet 2 is formed, at a central portion 20 thereof in cross section, by a single layer fiber-like sheet 21, and opposite side edge portions

22c forming the leg opening portions 7 are formed by a plurality of fiber-like sheets 23a and 23b and expansible elastic members (hereinafter referred to as the "first expansible elastic members) connectively held by and between the fiber-like sheets. First leg gathers 24a are formed at the leg opening portions 7 respectively by the first expansible elastic members 24. In this embodiment, the fiber-like sheet 21 and the fiber-like sheet 23a are formed of one sheet.

The absorbent body 3 is provided at opposite side edge portions thereof with expansible elastic members (hereinafter referred to as the "second expansible elastic member") 26 respectively, and a second leg gather 26a is formed by the second expansible elastic member 26.

The outermost layer sheet 2 is substantially larger in dimension than the absorbent body 3. The absorbent body 3 is peelably secured to a longitudinally generally center of the outermost layer sheet 2 by an adhesive A. Cutaway portions 6 and 6 are formed at those opposite side portions of the outermost layer sheet 2 where the absorbent body 3 is adhered, such that when the opposite side edge portions 22a and 22b of the stomach side portion and the back side portion of the outermost layer sheet 2 are fixedly connected to

each other respectively, the leg opening portions 7 and 7 are formed at the cutaway portions 6 and 6, thereby forming a shorts type diaper. In the outermost layer sheet 2, an upper part (back side portion) relative to a constricted part where the cutaway portions 6 are formed is provided with a pair of side flaps 8 and 8 extending width-wise outwardly, and a lower part (stomach side portion) relative to the constricted part is provided with a pair of side flaps 9 and 9 extending width-wise outwardly. Opposite end edges of the side flaps 8 and 8, and 9 and 9 are attached to each other, respectively, to form a shorts type.

Longitudinally opposite end edge portions of the outermost layer sheet 2 are provided with a pair of waist flaps 10a and 10b, respectively, extending outwardly of the absorbent body 3 so that when the shorts type diaper is formed, the waist opening portion 11 is formed. The waist flaps 10a and 10b are provided respectively with third expansible elastic members 12 disposed width-wise along the waist flaps 10a and 10b, respectively, to form a waist flap gather 12a, while the cutaway portions 6 are provided respectively with the first expansible elastic members 24 disposed longitudinally along the cutaway portions 6, respectively, to form the first leg gathers 24a, respectively, so

that when the diaper is in a wearing condition, fitness of the diaper to the wearer is enhanced and a slip-down of the diaper is prevented. Furthermore, since a fifth expansible elastic member 14 is disposed between the waist opening portion 11 and the leg opening portions 7 and 7 when the diaper is in a wearing condition, fitness of the diaper around the waist of the wearer is enhanced.

As shown in Fig. 3, the central portion 20 of the outermost layer sheet 2 in cross section is formed of a single layer fiber sheet 21, so that moisture of the absorbent core 17 in the absorbent body 3 is released to prevent the diaper from getting stuffy when the diaper is in a wearing condition. This single layer structure also enhances compliance at the central portion with the result that compliance to the wearer at the under-crotch portion becomes excellent.

The opposite side edge portions 22c and 22c forming the leg opening portions 7 are formed by a plurality of fiber-like sheets 23a and 23b, and the first expansible elastic members 24 connectively held by and between the fiber-like sheets 23a and 23b, respectively. By forming the opposite side edge portions 22c and 22c in at least two-layer structure, leak of fluid can be positively prevented at the opposite side edge

portions 22c and 22c.

In this embodiment, the fiber sheet 21 at the central portion 20 and the fiber sheet 23a at a lower side of the opposite side edge portions 22c are used as a common sheet. That is, as shown in Fig. 3, an additional fiber sheet 23b is superimposed on the opposite side edge portions 22c of the single fiber sheet 23a (or 21).

A liquid impermeable and moisture permeable film (vapor permeable film) 27 is disposed between the fiber sheet 23a and the fiber sheet 23b. In this embodiment, the opposite side edge portions 22c of the outermost layer sheet 2 are resulted in three-layer structure. In this three-layer structure, the first expansible elastic members 24 are connectively held by and between the film 27 and the fiber sheet 23b. In other words, the first expansible elastic members 24 are adhered to the liquid impermeable and moisture permeable film 27, and this film 27 is held by and between the plurality of fiber-like sheets 23a and 23b. Owing to the three-layer structure including the film 27, the diaper of the present invention can prevent more positively the fluid from leaking from that portion.

As the fiber-like sheets 23a and 23b, there is used a hydrophobic non-woven fabric (either a single

layer or a plurality of layers) or the like which is made into a sheet by a span bond system, a heat bond system, a steam entangling system using a fiber composed of, for example, polyethylene, polypropylene, and polyester, or a composite fiber thereof. If feel and outlook as well as strength and absorbability of urine are to be taken into consideration, the non-woven material is preferably 5 to 35g/m². For prevention of leak of urine, the non-woven material is preferably subjected to surface treatment with a water repellent agent.

As the liquid permeable and moisture impermeable film 27, a film composed of, for example, a thermoplastic resin such as polyolefin and an inorganic filler such as calcium carbonate added thereto and stretched is used.

It is designed such that when attached to the outermost layer sheet 2, the absorbent body 3 is located at an inner side of the first expansible elastic members 24 disposed at the cutaway portions 6 so that the first leg gathers 24a and the second leg gathers 26a are not superimposed one upon the another.

The absorbent body 3 comprises the liquid permeable topsheet 15 forming the side contacting the wearer's skin, the liquid impermeable backsheet 16 corre-

sponding to the topsheet 15, and the absorbent core 17 interposed between the topsheet 15 and the backsheet 16. The absorbent body 3 is provided with a pair of body flaps 18 and 18 extending width-wise outwardly from opposite side edges of the absorbent core 17, and the body flaps 18 and 18 are formed by the topsheet 15 extending width-wise outwardly and the backsheet 16. Opposite side edges of the body flaps 18 and 18 are provided with the second elastic expansible members 26 and 26 disposed longitudinally along the absorbent body 3 to form the second leg gathers 26a and 26a, respectively.

The body flaps 18 and 18 define free ends respectively, and the absorbent body 3 is peelably adhered at only a generally central portion of the backsheet 16 to the central portion 20 of the outermost layer sheet 2 by the adhesive agent A. By this arrangement, the second leg gathers 26a and 26a are easily formed by the second expansible elastic members 26 and 26.

Next, material of the main component portions of this embodiment will be described.

The topsheet 15 is preferably a liquid permeable sheet capable of permeating discharge material to the absorbent core 17 and having the feel something like an undergarment (next-to-skin wear). As a liquid perme-

able sheet as just mentioned, for example, a woven fabric, a non-woven fabric, a perforated film, and the like are preferable. It may be arranged such that a peripheral edge portion of the topsheet 15 is subjected to water repellent treatment by a method for applying a hydrophobic compound such as a silicon series oil solution or a paraffin wax to the peripheral edge portion, or by a method for beforehand applying a hydrophilic compound such as alkylic phosphilic ester to the peripheral edge portion and then washing the peripheral edge portion with a hot water, so that leak of urine, etc. can be prevented at the peripheral edge portion.

As the backsheet 16, there is used a moisture permeable and liquid impermeable sheet obtained by applying filler to a thermoplastic resin and stretching the same or one having the feel something like the undergarment such as, for example, a composite material of film and non-woven fabric, or a composite material of film and woven fabric.

The absorbent core 17 is preferably composed chiefly of a comminuted wooden pulp and a molecular water polymer, but it is also preferably a mixture of thermoplastic resin, cellulosic fiber, and molecular water polymer, which is subjected to heating. The

molecular water polymer may be located at an upper layer, an intermediate layer, or a lower layer. The molecular water polymer may be mixed with pulp. The molecular water polymer preferably has an ability for absorbing and retaining an amount of liquid 20 times or more its dead weight, and is preferably of a granular form readily to be gelled. Such molecular water polymer is preferably, for example, starch-acrylic (salt) graft copolymer or saponified material of starch-acrylonitrile copolymer. The absorbent core 17 is preferably of an hour-glass shape so as to conform to the wearer's body shape, but it may be rectangular.

The first, second, third and fourth expansible elastic members 24, 26, 12 and 14 are connectively attached, generally in stretched condition, to the absorbent body 3 and the outermost layer sheet 2 by means known per se, such as ultrasonical welding, heat welding, adhesive or the like. Material of them may be any known suitable one such as yarn rubber, flat rubber, film type rubber, or tape-like foamed polyurethane, and the number of them may be single or plural. Such expansible elastic member is particularly preferably 70 to 100g in stress when stretched 150%.

As the adhesive A, known peelable adhesive or the like is used. They are attached at an inner side of

the absorbent body 3, and preferably at an inner side of the absorbent core 17, either dottedly or linearly.

As material of the adhesive A, hot melt adhesive, styrene-butadiene copolymer, acrylic ester copolymer, vinyl acetate, ethylene-olefin copolymer, petroleum resin, cold glue or the like is used.

Operation of this embodiment will now be described.

The shorts type diaper of this embodiment is formed by connecting the opposite side edge portions of the side flaps 8 and 9 of the expanded outermost layer sheet 2 of Fig. 2 to each other to form the waist opening portion 11 and the pair of leg opening portions 7 and 7 as shown in Fig. 1. In this diaper, the absorbent body 3 is peelably attached to the outermost layer sheet 2 at an inner side thereof by the adhesive A. The opposite edge portions of the side flaps 8 and 9 are the opposite side edge portions 22a and 22b of the outermost layer sheet 2 at both the stomach side portion and the back side portion.

For wearing the shorts type diaper of this embodiment, the wearer inserts the legs into the waist opening portion 11, and pulls up the shorts type diaper so that the legs are inserted into the leg opening portions 7 and 7 respectively.

As described in the foregoing, in the shorts type disposable diaper of this embodiment, the waist flap gather 12a is formed at the waist opening portion 11 of the outermost layer sheet 3, and the first leg gathers 24a are formed at the leg opening portions 7 and 7 respectively when the diaper is in a wearing condition. Accordingly, fitness to the wearer, compliance and anti-leak are obtained. Moreover, owing to the provision of the fourth expansible elastic member 14, fitness to the wearer at the body area is enhanced.

As shown in Fig. 3, since the absorbent body 3 is adhered to the outermost layer sheet 2 at only the central portion when the diaper of this embodiment is in a wearing condition, the body flap 18 is easily erected to form a bag-like shape by the second expansible elastic member 26. Accordingly, discharge material can be positively arrested in the bag-like portion.

Furthermore, in the shorts type disposable diaper of this embodiment, the absorbent body 3 is formed with the second leg gather 26a, and therefore leak of discharge material from the absorbent body 3 to the outermost layer sheet 2 can be prevented. Since the second gather 26a as well as the first leg gather 24a of the leg opening portions 7 and 7 of the outermost layer sheet 2 are formed (that is, since a double gather is

formed), leak of discharge material from the leg portions can be more positively prevented.

Moreover, since the central portion 20 in the transversing direction of the outermost sheet 2 is formed by a single layer fiber sheet and the absorbent body 3 is supported by this single layer sheet 21, moisture permeability is not jeopardized, stuffiness during the wearing of the diaper is prevented, and fitness to the wearer at the undercrotch portion is enhanced. On the other hand, since the opposite side edge portions 22c of the outermost layer sheet 2 forming the first leg gather 24a are formed by the plurality of fiber sheets 23a and 23b and the support film 27, leak of discharge material from the opposite side edge portions is more positively prevented.

After the discharge material is discharged, the absorbent body 3 is peeled off the outermost layer sheet 2 for replacement, and a new absorbent body 2 is adhered to the outermost layer sheet 2 by the adhesive A. In this way, according to the embodiment of the present invention, only the absorbent body soiled with the discharge material can be exchanged easily.

The present invention is not limited to the above embodiment, but many changes and modifications can be made without departing from the spirit of the present

invention.

For example, as shown in Fig. 4, the first expandable members 24 may be intersected at the central portion of the cutaway portions 6 of the outermost layer sheet 2. The absorbent body may be so simple in structure as having a generally square shape.

According to a disposable diaper of the present invention, leak of discharge material can be effectively prevented, stuffiness can be avoided, and compliance to the wearer at the under-crotch portion is excellent.

Furthermore, according to a disposable diaper of the present invention, only a portion of the diaper soiled with discharge material can be exchanged.

WHAT IS CLAIMED IS:

1. A shorts type disposable diaper comprising an absorbent body including a liquid permeable topsheet, a liquid impermeable and vapor permeable backsheet placed opposite to said topsheet, and an absorbent core interposed therebetween, and an outermost layer sheet to which said absorbent body is connected and opposite side edge portions of a stomach side portion and a back side portion of said outermost layer sheet being fixedly connected to each other respectively to form a waist opening portion and a pair of leg opening portions,

wherein said outermost sheet is formed, at a central portion thereof in cross section, by a single layer fiber-like sheet, and opposite side edge portions forming said leg opening portions are formed by a plurality of fiber-like sheets and expansible elastic members connectively held by and between said fiber-like sheets, first leg gathers being formed at said leg opening portions respectively by said expansible elastic members.

2. A shorts type disposable diaper as claimed in claim 1, wherein said absorbent body is provided at opposite side edge portions thereof with expansible

elastic members respectively, and second leg gathers are formed by said expansible elastic members.

3. A shorts type disposable diaper as claimed in claim 1, wherein said expansible elastic members are adhered to a liquid impermeable and moisture permeable film, and said film is held by and between a plurality of fiber-like sheets.

4. A shorts type disposable diaper as claimed in claim 1, wherein said absorbent body is peelably secured to said outermost layer sheet.

5. A diaper of shorts type substantially as specifically herein described with reference to Figures 1 to 3, optionally as modified by Figure 4, of the accompanying drawings.

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6. A diaper of shorts type including an absorbent body and an elongate outermost sheet, the absorbent body comprising a liquid permeable topsheet, a liquid impermeable and vapour permeable backsheet opposed to it and an absorbent core interposed therebetween, the side edges of the end portions of the outermost sheet being connected together to form a waist opening and two leg openings, the central portion of the outermost sheet in transverse cross-section being constituted by a single fibrous sheet and the side portions of the outermost sheet which define the leg openings being constituted by a plurality of fibrous sheets between at least two of which expansible elastic members are retained which form leg gathers around the leg openings.

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Examiner's report to the Comptroller under
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Relevant Technical fields

(i) UK CI (Edition L) A3V

(ii) Int CI (Edition 5) A61F

Search Examiner

D BUCKLEY

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

24 AUGUST 1993

Documents considered relevant following a search in respect of claims

1-6

| Category (see over) | Identity of document and relevant passages | | Relevant to claim(s) |
|------------------------|--|--|-------------------------|
| P, X | GB 2253131 A | (KAO CORP) Whole document but especially Figure 3 and lines 7-12 of page 9 | 1, 2, 4 and 6 |
| X | GB 2124072 A | (DISPOSABLE DEVELOPMENTS) Whole document but especially Figures 1 and 2 and lines 67-71 of page 1 | 1 and 6 |
| X | EP 0215408 A2 | (KIMBERLY-CLARK) See especially Figures 11 and 12 | 1, 2 and 6 |
| X | EP 0115286 A1 | (B S F) See especially Figures 7 and 8 | 1 and 6 |
| X | WO 88/07337 A1 | (KIMBERLY-CLARK) See Figure 6 | 1 and 6 |

| Category | Identity of document and relevant passages -24- | Relevant to claim(s) |
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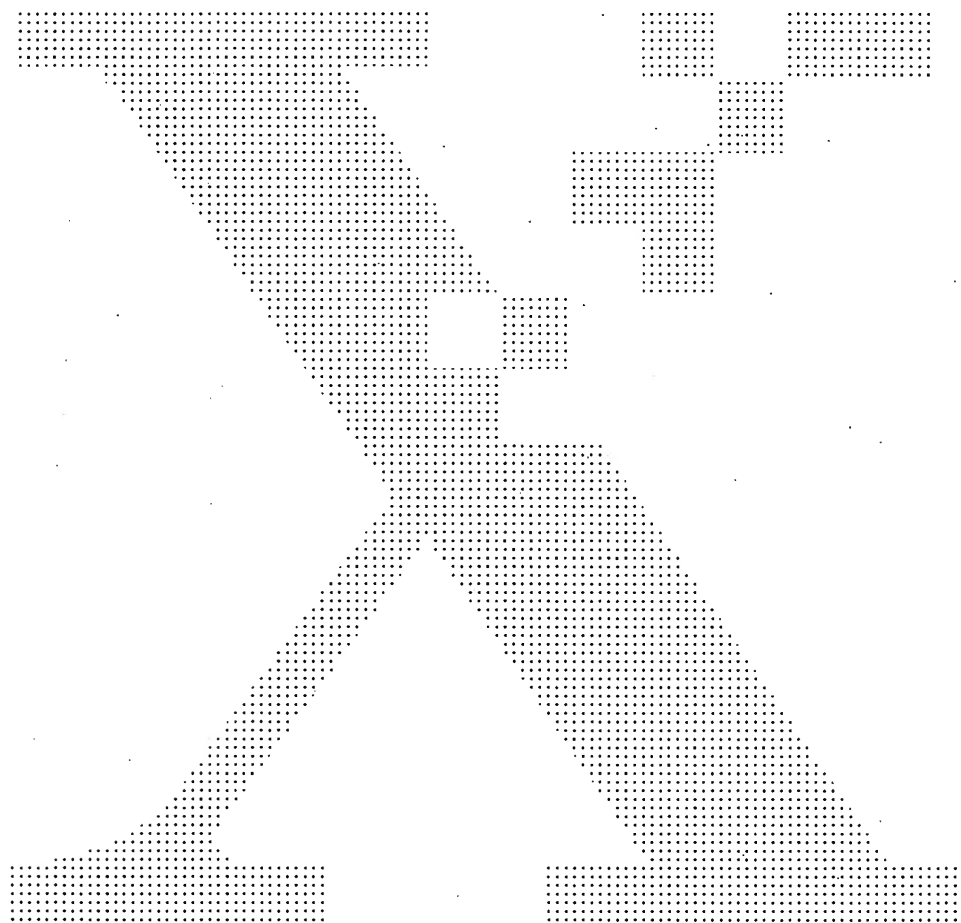
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(58) Field of search

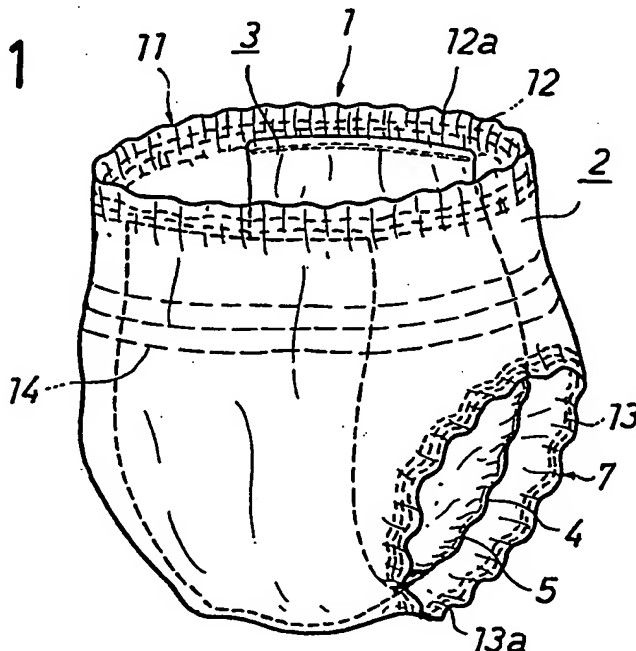
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(54) Diaper of the briefs type

(57) A diaper includes an absorbent body 3 and a water impermeable outermost layer 2 to which the absorbent body is fastened and which holds the absorbent body against the body of the user. The absorbent body comprises a liquid impermeable outer sheet (16, Fig. 3), a liquid permeable inner sheet (15) and an absorbent member (17) therebetween. The outermost layer 2 has front and rear portions whose edges (8, 9, Fig. 2) are connected together, e.g. by welding, so that it is in the form of a pair of briefs with a waist opening 11 and two leg openings 7. The outermost layer 2 carries at least one expansible elastic member 12, 13 around the waist opening and the leg openings which form gathers around those openings. The absorbent body 3 may be removably fastened to outermost layer 2, e.g. by peelable adhesive connections (A).

Fig .1



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Fig .1

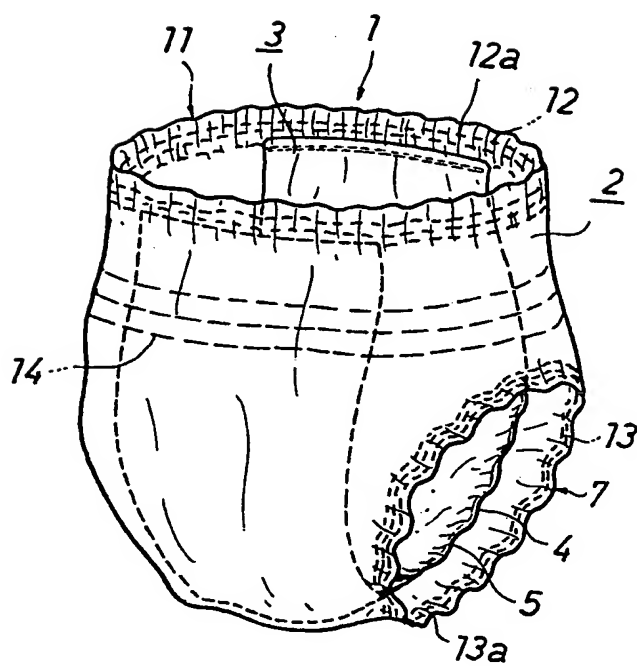


Fig .2

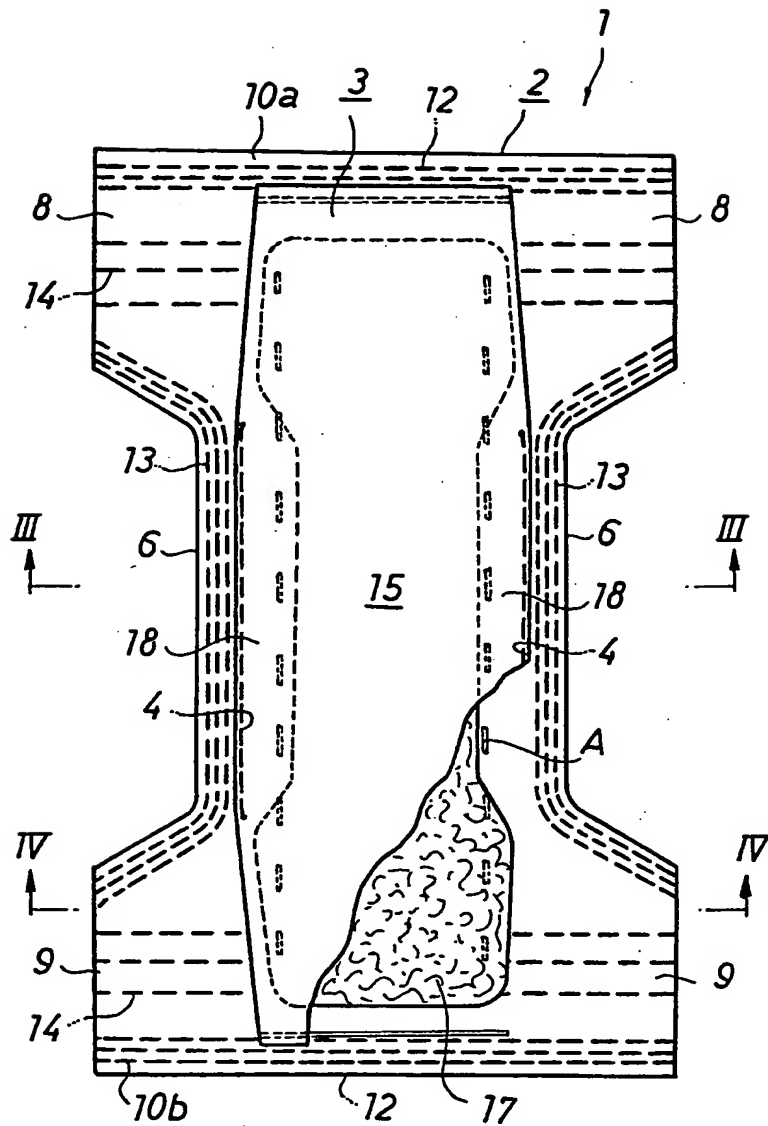


Fig .3

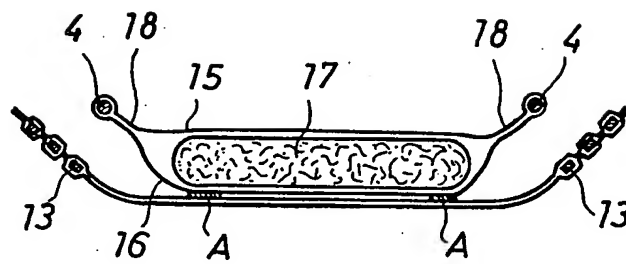
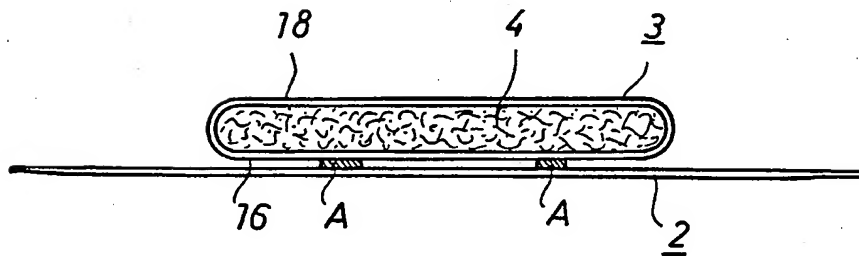


Fig .4



DIAPERS

The invention relates to diapers for use by babies, children or incontinent adults and is concerned with that type of diaper which is of briefs type, that is to say is in the form of a pair of pants or shorts.

The most widely used type of disposable diaper is of so-called flat type, as disclosed for example in Japanese Patent Publication No. Sho 52-40267, which has a main body comprising a liquid permeable inner sheet, a liquid impermeable outer sheet and an absorbent member disposed therebetween. The main body is provided with a side flap extending laterally from each side edge thereof. Each side flap is provided with an expansible member forming a gather. Each side flap is further provided with fastener means on the rear surface of its side edge in order to provide adjustability so as to improve the fit and anti-leakage properties of the diaper. Another known diaper is of the type disclosed in Japanese Patent Early Laid-open Publication No. Sho 62-250201, in which three dimensional gathers are formed on the leg portions and a flap portion around the absorbent member is provided with a water-repellent treatment in order to improve the anti-leakage characteristics.

In order to improve the fit and ease of wear, a disposable diaper of so-called briefs type has recently been proposed in Japanese Patent Early Laid-open Publication No. Sho 57-77304. In this diaper, a front area and a back area of a pair of side flaps are connected together in order to form a pair of leg

opening portions and a waist opening portion. The leg opening portions and the waist opening portion are designed to be expansible in order to facilitate an easy fit to the wearer's body. Such a briefs type disposable diaper can usually be worn by a wearer in a standing posture. Therefore, it is often conveniently used as training wear for infants who need a training to do without a diaper, or as underwear for incontinent persons or adults who find it impossible to walk.

However, since the above-mentioned briefs type disposable diaper is necessarily relatively narrow in the under-crotch portion, the expansible elastic member cannot be positioned remote from the absorbent member. As a result, the intended expansibility of the elastic member is not available due to the effect of the rigidity of the absorbent member. Furthermore, the connected portion of the front and back areas are readily wrinkled and spaced apart because of the provision of the expansible elastic member, thus providing a route for the leakage of waste materials. Furthermore, it was found not to be possible to provide a three-dimensional structure of the leg gathers, which is very effective for anti-leakage purposes, due to the narrowness of the under-crotch portion and manufacturing difficulties.

The effective technique for making the peripheral portions water-repellent in order to prevent leakage, particularly of urine, was unable to exhibit its full effect in a briefs type diaper because in practice the narrow under-crotch portion prohibited the formation of clearly separate hydrophilic and water-repellent

portions. Moreover, the conventional method for making a briefs type diaper rendered it impossible to provide a water-repellent portion around the waist portion.

It is only in the vicinity of the urine discharge point that the conventional disposable diaper functions to absorb and return waste materials. Therefore, only the vicinity of the urine discharge point becomes soiled, and other portions, such as the side portions of the waist, do not become substantially soiled. It is, therefore, wasteful and uneconomical to dispose of the whole diaper.

It is therefore an object of the present invention to provide a disposable diaper of briefs type which is capable of reliably preventing leakage of waste materials, which has an excellent fit and which may be worn by wearers of various sizes.

Another object of the invention is to provide a disposable diaper which allows the exchange and disposal of only that portion which becomes soiled with waste materials.

According to the present invention a diaper includes an absorbent body comprising a liquid permeable inner sheet, a liquid impermeable outer sheet and an absorbent member disposed therebetween, and a water impermeable outermost layer to which the absorbent body is fastened and which, in use, holds the absorbent body against the body of the user, the outermost layer having front and rear portions whose edges are connected together so that it is in the form of a pair

of briefs with a waist opening and two leg openings, the outermost layer carrying at least one expansible elastic member around each leg opening which forms a gather around that opening.

In the preferred embodiment the outermost layer includes a crotch portion connecting the front and rear portions and the absorbent body is elongate and overlies at least a proportion of the front, rear and crotch portions, each side edge of the absorbent body being unconnected to the outermost layer and being provided with at least one expansible member which forms a gather in the side edge, at least in that portion thereof which overlies the crotch portion.

Thus in the diaper in accordance with the present invention the absorbent body is held against the body of the user by the outermost layer or sheet and the outermost sheet is gathered around the legs of the user so as to prevent leakage of waste materials. In the preferred embodiment, the side edges of the absorbent body are free and are also gathered, at least in the crotch region, and this further contributes to the leakproof qualities of the diaper. These qualities are further enhanced by the fact that the outermost layer is water impermeable, and preferably water repellent, whilst the absorbent body is highly absorbent or hydrophilic.

The outermost layer may carry further expansible elastic members forming gathers around the waist opening and/or at a position between the waist opening and leg openings.

In the preferred embodiment the absorbent body is removably fastened to the outermost layer, e.g. by a peelable adhesive connection. This permits a soiled absorbent body to be removed from the outer layer and replaced with a fresh one whereby only a portion of the diaper need be replaced, when soiled.

Further features and details of the invention will be apparent from the following description of one specific embodiment which is given by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a disposable diaper in accordance with the present invention;

Figure 2 is a plan view, partly cut-away, of the diaper of Figure 1 in an expanded state;

Figure 3 is a sectional view of the diaper on the line III-III in Figure 1; and

Figure 4 is a sectional view of the diaper on the line IV-IV in Figure 1.

The briefs type disposable diaper shown in the drawings includes a briefs type outermost impermeable layer 2, and an elongate absorbent body 3 secured generally to the centre of the layer 2. The outermost layer 2 is of generally overall rectangular shape but has a concave portion 6 in each side edge and is thus of reduced width over its central portion and therefore comprises front and rear portions, with side flaps 8 and 9, respectively, connected by a central crotch portion. The side flaps 8,9 extend laterally beyond the width of the absorbent body 3. The concave portions 6 form leg

openings 7 when the flaps 8 and 9 are connected to form the briefs, as shown in Figure 1. As shown in Figures 2 to 4, the absorbent body 3 is of generally elongate rectangular shape smaller than the outermost layer 2 and extends over the crotch portion of the sheet 2 between points adjacent the ends of the sheet 2. Each side edge of the absorbent body 3 is provided with a first elastic member 4 extending over the length of the associated concavity 6 thereby forming a leg gather 5 on the absorbent body 3.

The absorbent body 3 is secured peelably and generally centrally in the longitudinal direction, to the inner surface of the outermost layer sheet 2 by two parallel interrupted lines of adhesive material A.

As mentioned above, the edges of the side flaps 8 are connected to those of the side flaps 9, e.g. by welding to make the diaper of briefs type. Between the ends of the absorbent body 3 and the associated ends of the outermost layer 2 there are waist flaps 10a, 10b extending outwardly of the absorbent body 3, which define a waist opening 11 when the diaper is in the configuration of a pair of briefs. Extending around each of the waist flaps 10a and 10b are stretched second elastic members 12 which form a waist gather 12a around the waist opening 11. Extending along the edges of each concave portion 6, laterally outside the associated side edge of the absorbent body 3, are third elastic members 13 which form gathers 13a around each leg opening 7. The fit of the diaper to the wearer is thus improved and slipping down of the diaper is prevented when it is worn. A number of fourth elastic

members 14 extend in or on the front and back portions of the outermost layer 2 at positions between the waist opening 11 and the leg opening portions 7, so that the diaper fits the wearer better, particularly around the body.

The absorbent main body 3 is positioned such that when it is adhered to the outermost layer 2, the gather 13a around each leg opening caused by the third elastic members 13 does not overlap with the associated gather 5 in the body 3. The absorbent body 3 comprises a liquid permeable inner sheet 15 which, in use, contacts the wearer's skin, a liquid impermeable outer sheet 16 and an absorbent member 17 interposed therebetween. The absorbent body 3 is provided with main body flaps 18 extending laterally from each side edge of the absorbent member 17, and the first elastic members 4 for forming the gathers 5 are provided in the side edges of the main body flaps 18 and are stretched in the longitudinal direction of the absorbent body 3.

The absorbent main body 3 is adhered at its bottom surface, i.e. at the outer sheet 16, to the outermost layer 2 by the adhesive A which is inside the body flaps 18 so that the leg gathers 5 can be easily formed.

The inner sheet 15 is liquid permeable so as to permit waste materials to permeate therethrough into the absorbent member 17 and to have a feel approximating to that of conventional underwear. Examples of such liquid permeable sheets are woven fabrics, nonwoven fabrics, perforated films and the like. Leakage of

urine, etc. through the peripheral portion of the inner sheet 15 can be prevented by applying a water-repellent treatment to the peripheral portion thereof, e.g. by applying a hydrophobic compound such as oil solution of the silicon series, paraffin wax or the like to the peripheral portion 2 or applying a hydrophilic compound, such as an alkyl phosphate, to the entire inner sheet 15 and then cleaning the peripheral portion with warm water.

The outer sheet 16 is a liquid impermeable sheet, e.g. formed by stretching a thermoplastic resin with an added filler and having moisture permeable properties or a sheet having a feel similar to that of the wearer's underwear, such as a composite material composed of a film and a non-woven fabric or a film and a woven fabric.

The absorbent material 17 is preferably formed chiefly of an open cell pulp but also of a high molecular weight absorbent polymer. Another preferred composition of the absorbent member 17 is a mixture of a thermoplastic resin, a cellulosic fibre, and a high molecular weight water absorbent polymer subjected to heat treatment. The high molecular weight water absorbent polymer may be located in any of the upper layer, intermediate layer and lower layer of the absorbent body and it may also be mixed with a pulp. The high molecular weight water absorbent polymer is preferably in granular form and able to absorb and retain more than twenty times its own weight of liquid and able to be gelled. Examples of such high molecular weight water absorbent polymers are

starch-acrylic (salt) graft copolymer, a saponified material of starch-acrylonitrile copolymer, bridged material of sodium carboxymethylcellulose, acrylic (salt) polymer and the like. The absorbent member 17 is preferably of hourglass shape, as shown in Figure 2, but it may also be rectangular.

The outermost layer or sheet 2 is preferably a highly flexible sheet which is liquid impermeable but air permeable and which has a feel similar to that of conventional underwear. Examples of such a sheet are woven fabrics, non-woven fabrics and the like. which have been subjected to a water-repellent treatment. A highly flexible sheet, one or both surfaces of which are laminated with a non-woven fabric, is particularly preferred because it has a comfortable feel and an excellent ability to prevent oozing or leakage of urine.

The first, second, third and fourth elastic members 4, 12, 13 and 14 are connected to the absorbent body 3 and the outermost sheet 2 in generally stretched states by means known in the art, such as ultrasonic welding, heat welding, adhesive etc. Any material known in the art, such as yarn rubber, flat rubber, film type rubber or tape-like foam polyurethane can be used, and each elastic member may be unitary or multipart construction. The stress is particularly preferably 70 to 100g when they are stretched by 150%.

A known peelable adhesive material may be used as the adhesive material A, and such adhesive material A is adhered at a plurality of spots or linearly on the

inner surface of the absorbent body 3.

Operation of the diaper is as follows:

The side edges of the side flaps 8 and 9 of the outermost sheet 2, as seen in the expanded state shown in Figure 2, are connected together to form a briefs type diaper having a waist opening 11 and a pair of leg openings 7. The absorbent main body 3 is peelably adhered to the inner surface of the sheet 2.

The legs of the wearer are inserted into the waist opening 11 and the diaper is then pulled up in order to insert the legs into the leg openings 7. When being worn, gathers are formed at the waist opening 11 of the outermost sheet 2 and at the leg openings 7 in order to improve the fit and compliance to the wearer and to prevent leakage. Moreover, the fit around the body is improved by virtue of the provision of the fourth elastic members 14 around the body.

The absorbent body 3 is also provided with leg gathers 5 so that waste materials may not leak from the absorbent body 3 onto the outermost layer 2. Since there are double gathers around each leg, i.e. the gathers 5 and 7, a reliable prevention of leakage through the leg openings is ensured.

After the absorbent member 17 has been soiled, the absorbent body 3 is peeled off the outermost sheet 2 and a new absorbent body 3 is adhered in its place. Thus only the soiled absorbent body 3 need be replaced and not the entire diaper.

It will be appreciated that the present invention is not limited to the embodiment described above, but can be modified in various ways.

CLAIMS

1. A diaper including an absorbent body comprising a liquid permeable inner sheet, a liquid impermeable outer sheet and an absorbent member disposed therebetween, and a water impermeable outermost layer to which the absorbent body is fastened and which, in use, holds the absorbent body against the body of the user, the outermost layer having front and rear portions whose edges are connected together so that it is in the form of a pair of briefs with a waist opening and two leg openings, the outermost layer carrying at least one expansible elastic member around each leg opening which forms a gather around that opening.

2. A diaper as claimed in claim 1 in which the outermost layer includes a crotch portion connecting the front and rear portions and the absorbent body is elongate and overlies at least a proportion of the front, rear and crotch portions, each side edge of the absorbent body being unconnected to the outermost layer and being provided with at least one expansible member which forms a gather in the side edge, at least in that portion thereof which overlies the crotch portion.

3. A diaper as claimed in claim 1 or claim 2 in which the outermost layer carries at least one expansible elastic member around the waist opening which forms a gather around that opening.

4. A diaper as claimed in any one of claims 1 to 3 in which the outermost layer carries at least one expansible elastic member which extends across the

front and rear portions at a position between the waist and leg openings and serves, in use, to tighten the outermost layer against the body of the wearer.

5. A diaper as claimed in any one of the preceding claims in which the outer sheet has water-repellent properties.

6. A diaper as claimed in any one of the preceding claims in which the absorbent body is removably fastened to the outermost layer.

7. A diaper as claimed in claim 6 in which the absorbent body is fastened to the outermost layer by a peelable adhesive connection.

8. A diaper substantially as specifically herein described with reference to the accompanying drawings.

Patents Act 1977

Examiner's report to the Comptroller under
Section 7 (The Search Report)

-14-

Application number

9203645.8

Relevant Technical fields

(i) UK CI (Edition K) A3V

(ii) Int CL (Edition 5) A61F 13/72

Search Examiner

D BUCKLEY

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

24 APRIL 1992

Documents considered relevant following a search in respect of claims

1 TO 8

| Category (see over) | Identity of document and relevant passages | Relevant to claim(s) |
|------------------------|---|-------------------------|
| X | GB A 2183991 (PROCESS IMPROVEMENTS) whole document | 1, 3, 5, 6 and 7 |
| X | GB A 2124072 (DISPOSABLE DEVELOPMENTS) whole document | 1, 3, 5 and 6 |
| X | GB 1520740 (COURTAULDS) whole document | 1 and 3 to 7 |
| X | EP A2 0274753 (KIMBERLY-CLARK) see eg Claim 1 and lines 14 to 50 of column 11 | 1 to 3 at least |
| X | WO A1 88/07337 (KIMBERLY-CLARK) see eg Claim 1 and lines 3 to 5 of page 12 | 1 to 3 at least |

| Category | Identity of document and relevant passages | Relevant to claim(s) |
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X: Document indicating lack of novelty or of inventive step.

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